THE VIRTUAL SKELETON DATABASE: A WEB REPOSITORY FOR MEDICAL IMAGES AND PROCESSED DATA

Michael Kistler (1), Nicolas Biedermann (2), Rajib Mitra (2), Marcel Pfahrer (2), Philippe Büchler (1)

1. Institute for Surgical Technology and Biomechanics, University of Bern, Switzerland; 2. Bern University of Applied Science, Switzerland

Introduction

Recently, statistical shape analysis (SSA) has been developed to model shape variability. The method enjoys a remarkable popularity within the medical image analysis community to model the variability of human anatomy in specific populations. Since its invention, many groups worldwide started to investigate the capabilities of these techniques to study human anatomy. Nonetheless, a recurrent problem that is faced when applying statistical shape model (SSM) to a specific clinical indication, is the large amount of data required to build a valid model.

A repository is therefore vital for fast development of new applications or image processing algorithms based on this technology. Existing picture archiving and communication systems (PACS) are intended for clinical use and does not serve as a repository for further processed data and shape models. A general database where medical image datasets are stored and further processed towards statistical shape modeling is required.

The objective of this project is to develop a system called the "Virtual Skeleton Database" (VSD). The system will provide tools to manage medical images and related information. It will offer a set of methods for statistical shape and intensity analysis, related web services for sharing and validating medical images and applications.

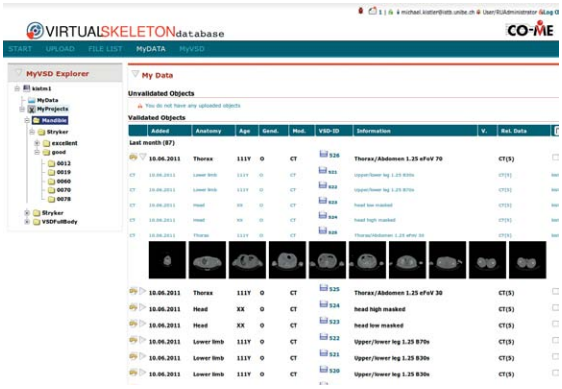

Figure 1: VSD Web interface: User folders, uploaded data, its related objects and data preview

Methods

The VSD servers are running windows with MS SQL 2008 database and Internet Information Services web server. The DICOM library. ClearCanvas is used for the PACS functionality while the web interface (Figure 1) uses DOTNET and JAVA technology. Furthermore, the WebDAV protocol was implemented which allows for local usage of the VSD data. Finally, the FMA ontology is used for the annotation of the anatomical regions and ensure consistency of the meta-information.

Results

The VSD online services for sharing and validating medical images and applications were implemented. The system includes full functionality for DICOM files and is read to be extended to other types of objects such as metaimage, STL or hdf5 file format. A selected group of users across different Swiss Universities are currently using the VSD. They have uploaded about 100GB of CT and MR data including 25 post mortem full body CT scans and segmented data (Table 1). Users are able to manage the files in their project folders or organize and contribute to projects on a group level as well as download available datasets.

	Files	Series
Medical images	200'000	340
Processed data	25'000	90
Total 100GB	225'000	430

Table 1: Data collection hosted by the VSD.

Discussion

Yet limited to DICOM the VSD is a helpful tool to store, manage and find medical image data. Its current sharing and searching ability remains basic and will be improved in future releases. By extending to other types and formats as well as increasing the data collection the VSD has the potential to become a standard tool for the image processing community.